

Forward Thinking - Innovation Policy in Australia: never a better time?

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Few doubt that innovators can reap great returns, but many in the community don't see themselves as winners. Others believe that there is not much government can do to affect innovation.

Innovation and Science Australia has just released its plan for Australia's innovation, science and research system, *Australia 2030: Prosperity through Innovation*. The report argues that innovation can make a big difference for all Australians and that there is much government can do to speed it up. How big is the opportunity for Australia? Who really benefits from rapid innovation? Should policymakers follow ISA's recommendations? At this *Forward Thinking* event, a panel that included the authors of the report used these questions to form the basis for an engaging discussion on innovation policy.

Speakers: Bill Ferris AC, Chair, Innovation & Science Australia Board
Petra Andrén, CEO, Cicada Innovations
Dr Alan Finkel AO, Australia's Chief Scientist

Moderator: Jim Minifie, Productivity Growth Program Director, Grattan Institute

JIM MINIFIE: Well, why don't we make a start, because time is whizzing by. Good evening everybody, it's so great to see you all here. My name is Jim Minifie and I'm from the Grattan Institute where I run the Productivity Growth Program. It's great to see some familiar faces and a lot of new ones as well for what I'm expecting to be a really fascinating discussion. Thank you to our guests, who I'll introduce in just a moment. Firstly, if I can very happily acknowledge the traditional owners of the land and thank our hosts, the State Library, it's been a great relationship for us and a great venue.

Let me now get into the topic at hand, which is around the vexed issue of innovation. All advanced societies struggle with innovation policy and Australia's no exception; we've got some real strengths and some real weaknesses. The origin for tonight's discussion was this document, *Australia 2030: Prosperity Through Innovation*, which finished up late last year and was released early this year by Innovation & Science Australia (ISA), which is the best current iteration of how Australia can respond to some of these advanced economy economic policy challenges, and who better to have the discussion than our three panellists tonight. Let me quickly introduce them. First is Bill Ferris AC, the Chair of ISA's board, so that is the board that was responsible for producing this document. Welcome Bill and thanks for joining us. Next is Petra Andrén, the CEO of Cicada Innovations, Australia's only super-incubator providing business support to a large collection of advanced technology start-ups. Welcome Petra, great to have you here, thanks for joining us. Finally, Dr Alan Finkel AO, Australia's Chief Scientist and also the Deputy Chair of ISA.

What I thought I'd do, without going through all of your background - you've all had very interesting careers that are still actively progressing - is give all of you a bit of a chance to explain why you're here and what interests you in this domain. So Bill, perhaps if I can start with you and ask what is ISA, why are you excited about it and what would success look like for ISA?

BILL FERRIS: Jim, firstly, thank you very much to the Grattan Institute for hosting and making this happen, it's very helpful. ISA is an independent statutory authority of the federal government with a remit for a couple of things. The main one is to provide independent advice to government, to the Cabinet and the Prime Minister. Our board is 15 members, now down to 13 with a couple of retirements, of basically private sector practitioners, venture capitalists, educators and the Chief Scientist. I guess I fall into the category of a venture capital private equity backgrounded person and was invited to chair this board two years ago. The first remit was to look at the innovation system in Australia as it exists, is it performing or not, and what would you do to turbocharge the performance nationally of our innovation capability out to 2030? So that's remit number one and remit number two is an ongoing oversight and evaluation role on existing programs. So I took that on, that invitation, as I think my fellow board members have, because of a sense of urgency about what needs to be done and a sense of opportunity that it is possible to lift the performance of this country dramatically if we do a few things. Our report, to which you referred, we think is a potential fix with its 30 recommendations, if government and stakeholders take it on, to really transform the nation over the next 10 to 15 years, if implemented and followed.

You asked what success would look like. Well, to get there we need implementation but, secondly, we want to see Australia as a place where you finish up with sustainable jobs and growth and, therefore, a real crack at having an inclusive society, not just a prosperous one for a few. We want this to be a sustainable plan for society as a whole and we think it can be. We're prepared to be measured on a number of metrics. I won't go through them all, but page 99 of the report lists 17 actual metrics against which this plan and the country's performance could be measured against international competitive countries. Of course, the starting point for this is the reality that we are lagging badly on our innovation competitors around the world, OECD countries and a few others, like Israel, Singapore and China etc. so we've got to catch up and we've got to get on with it.

JIM MINIFIE: Thank you so much, Bill. Now Petra, Cicada. What is it and what does success look like for it?

PETRA ANDRÉN: It's a weird and wonderful beast, is the best way that I can describe it. Cicada Innovations is one of Australia's oldest and arguably most successful technology business incubators. We've changed a lot throughout the years. I shudder every time I hear the word "super-incubator" because it's such an American word, but it is a word actually and what it means is that we create and validate our own businesses through highly specialised accelerator programs that we then go on to nurture inside the state-of-the-art incubator that we have. The recipe for success really is the long term support that we are able to provide to these businesses. Now, deep-tech has become a word and, unfortunately, it means something slightly different to everyone. In my world, when I say that we work with deep-tech companies it means that we work with those companies that are tackling really difficult problems. Another way to look at it is to say that they have a sustainable competitive advantage through something that can't easily be replicated, so oftentimes it's a piece of intellectual property, but it could be something else. We work across industry, so all the way from medtech to agtech to robotics, AI, you name it, and what these businesses have in common is that they take a little bit longer to get to market, but when they do get to market they have a real impact. It's really those sorts of businesses that have the ability to change the way that we try and solve some of the global issues today, like climate change, food security, you name it.

What I need to mention as well is that this organisation, if I said when I started it's weird and wonderful, it's got a pretty special setup. It's owned by four of Australia's top universities, so University of Sydney, University of Technology Sydney (UTS), University of NSW (UNSW) and Australian National University (ANU), but we're a private independent for-profit organisation. That means that I'm in a unique position because I sit right between the commercialisation of research, industry and movement of people. NISA (National Innovation and Science Agenda) to me is so important. I can tell how actually these initiatives are impacting the industry firsthand because of where I sit. So I'm really excited to be here today to tell you more about it and what I think about it.

JIM MINIFIE: Great Petra, thank you so much. As you'll hear, one of the big challenges for Australia is precisely around the translation - that step from research into commercialisation - so it's great to have you here. Finally, Alan, you're the Chief Scientist. Does that mean you oversee the whole lab? How does that work? What does success look like for a Chief Scientist?

ALAN FINKEL: Well, I can answer that little question right upfront: I have no line responsibility over the scientists of Australia. The formal challenge or job responsibility for the Chief Scientist is to advise the Prime Minister, the Minister of Industry, Innovation & Science and other ministers, where relevant, on issues to do with science policy. The second part of my contract requirement is to be an advocate within the community to explain where the opportunities are and what science and technology can do for us, and the third is, to some extent, to build science diplomacy bridges with other countries, but the reality is it's probably different in the hands of each person who's appointed as the Chief Scientist. So it's been interesting, because I've got a business background as well as a science background I've been invited to be involved in things as far-ranging as co-chairing with Bill and John Fraser a review into the Research and Development Tax Incentive (RDTI) - and tax is not normally an area where Chief Scientists are involved - through to a project that I'm doing at the moment for the Education Ministers around Australia on how to optimise science education, so-called STEM education, in schools. So it's a huge range of activities.

JIM MINIFIE: Terrific. Again, thank you to all three of you. Let's, in the spirit of getting through quite an ambitious agenda, get started on the report. Bill, you said in your introductory comments that Australia is not at the top of every ranking. I presume that it varies across rankings, so how do we fare? ISA has looked at how Australia stacks up. Are there some highlights and lowlights that people ought to be across, before we dive into what to do about it?

BILL FERRIS: Yes, there are. There is a global innovation index, which is a single attempt to measure a national positioning, and it has an OECD-dominated population of countries. In that index we're sort of somewhere below halfway. We have a lot of problems with that index and we won't go into it tonight, but Alan's got an ongoing project to try and point out to the OECD makers of that index that they've got a few things wrong. That said we do really well in terms of creating the excellence of our knowledge measured by citations and publications. We rank in the top quartile, in fact we rank sixth out of the list of close to 40 countries that we measure against in terms of original knowledge, citations and publications per million of population. Way up there. We do not match that excellence in knowledge creation by the excellence in our translation and commercialisation thereof and therein lies a big challenge: why? There's a mix of reasons from the education system, right through to how we've motivated and required research dollars to be allocated to our researchers. It was based on the excellence of your knowledge and your publications and had virtually nothing to do with its relevance

or importance to the marketplace or to industry. That is changing, that is underway, and it's got a lot further to go.

In terms of things we do well and things we don't do well, we spend a lot of time looking internally and comparing ourselves externally, and that's why I mentioned this selection of 17 indicators that we have going forward to track ourselves against in terms of government's performance as innovators, in terms of how we procure and so on. So we can probably get to some of those questions as we go.

JIM MINIFIE: We'll touch on those on the way through. My understanding about the private sector performance is that we're rapid adopters, early adopters of technology, but potentially not as strong at bringing new-to-world innovations to our markets. Is that a fair assessment?

BILL FERRIS: Yes.

JIM MINIFIE: Right, okay.

ALAN FINKEL: Can I add to Bill's short answer?

JIM MINIFIE: Yes.

ALAN FINKEL: To some extent it's what you're looking for. So if you're looking for a success in what you called a deep-tech field, the very modern, rapidly-advancing digital technology areas, I think your question and Bill's answer is correct; we're not even close to being comparable to what you see in the US or in Israel. But there's a lot of innovation across the economy in our traditional industries that is often forgotten and we've just seen an instance through your question - and I don't mean this rudely. The focus is on the modern high-tech in everything that we're talking about, but I like to talk about the success that BHP and Rio Tinto have had over the years where between them and Fortescue they've increased our share in percentage terms of iron ore exports in the last 15 years in a worldwide market that's tripled. So the actual total increase in exports is huge in a very, very competitive world. They've done that through the adoption of really clever technology and innovation. It's the autonomous vehicles, it's the algorithmic process control, it's working with universities, like University of Queensland (UQ) and University of Sydney, and with corporate partners, such as Caterpillar and some of the Japanese companies. It's quite staggering what they've done and the result is they can get the iron ore out of the ground less expensively by far than before with less environmental damage and a better safety profile. But we tend to ignore that.

JIM MINIFIE: You could tell a similar story about agriculture, which has had decade on decade improvement in productivity with significant inputs from CSIRO and the rest of the research infrastructure.

BILL FERRIS: Jim, they're great reminders. Alan's right to point that out, as he does regularly, and I agree with him, but we had the GFC and the slowdown in the investment boom in mining, not the efficiency of our exports still, but the slowdown in that and the terms of trade not just falling in our favour again. Looking to how we drive productivity - and innovation does drive productivity - how do we do that going forward? It's going to have to be by way of new stuff, commercialising a heap more of our own ideas and inventiveness here in a wider range of industries.

JIM MINIFIE: Petra, can I ask you in your domain of let's call it research translation and commercialisation?

PETRA ANDRÉN: Science-based innovation, yes.

JIM MINIFIE: Science-based innovation. How does Australia stack up versus the peers? So when you talk to the heads of like organisations around the world, do you see Australia falling significantly short in the kinds of conditions that make your type of activity successful?

PETRA ANDRÉN: The interesting thing is that Australia actually has all of the ingredients to make a real bang in this space and it really is about bringing things together. It's about collaboration and it sounds very cliché. To give you an example, and I'm going to be a bit controversial here, I started doing something. I wanted to get the researchers to come and engage with my start-ups and my scale-ups and it was so difficult to get them to come and just have some beer and pizza; they had to go through some intellectual property seminars etc. But once we started this going and we started to have informal meetings where researchers, industry and start-ups could actually meet and have convergence of technologies and thoughts, that's when interesting things start to happen. I'm bringing that up as an example because it's so important that movement of people between academia and start-ups, movement of PhDs. There are so few PhDs that are actually employed or researchers that are employed by industry in Australia. That's really what needs to change.

JIM MINIFIE: Do we do equally badly or worse than other countries?

PETRA ANDRÉN: We're not doing well at this and we have all sorts of reports that Bill's already referred to, to prove that, but what I'm saying is that I think it's actually quite easy to fix. That's what I'm trying to say. And yes, I live in a micro-cosmos and I am fortunate because I have direct access to four universities and have a critical mass of 400 of the brightest minds in Australia that are working on very interesting technologies in the start-up world, but what can work on a microscale should be able to work on a national scale. What I see work in my little world, I would like to see that working at a larger scale, so what I'm saying here is that I'm really positive about the potential. We have everything there, we just have a leaky pipeline, if that makes sense, a leaky innovation pipeline and the leakage comes when it comes to commercialisation. We've got all the ideas, we've got all the research, but how do we bring it forward and how do we capture the value, rather than giving it to some big global corporation and letting them get all the value?

JIM MINIFIE: A question for maybe all of you on the panel. From a sceptical standpoint there would be a view that says of course innovation matters to push forward that global technology frontier and to drive our civilisation forward, but why should a small country with 24 million people not just freeride? You can buy all of these things off the shelf. Someone's going to invent them and you can go onto Amazon, you can go onto eBay wherever, and can buy all the hardware. So why does Australia need to fix its own leaky pipeline and build its own sophisticated IP production process? Why don't we just become, if you like, off-the-shelf purchasers of all of this good stuff and let somebody else do the inventing?

PETRA ANDRÉN: You start, Bill.

BILL FERRIS: I'd have three headings. I'd have a heading of security, why you shouldn't do that; I'd have a heading about commerciality, the practicality of it; and a heading of culture, what sort of country do you want? I've got some ideas on that but Petra, you and Alan go first.

PETRA ANDRÉN: Alan, do you want to go first?

ALAN FINKEL: No, you go first.

PETRA ANDRÉN: I'll go first? I'm so upset I kind of have to breathe in and out, I think, to answer this question. I don't want to become a peanut colony. I came to Australia for a reason! No, look, Jim, you actually said something really good which I like, so I'm going to steal it. You have to be close to cutting edge to be able to adapt or adopt cutting edge, that's one really important thing. The other thing is I do agree that we try to be good at everything and I do think one of the only criticisms - well, I have got a few, but one of the criticisms that I have with the NISA report is that we're trying to do a bit too much and we need to focus. Where are our strengths? Where can we be really good? Because we can't be good at everything, let's face it, we're a small country. Having said that, there are some things we can become really good at where we can actually become world leaders and we've got a real chance, but we need to capture value, we need to upskill, we need to be in the game. I don't think that the right thing is to just go and buy off-the-shelf from the rest of the world. I do think we should be part of it and, looking at all the research and great publications that we've got coming out of our institutions, we have a real chance to be part of it. Why shouldn't we want to?

ALAN FINKEL: Jim, there are some very practical reasons. First of all, if we're going to buy all that technology in, buy everything that we need, we need something to exchange. We need to trade, we need to sell something and what are we selling? At the moment we're selling agricultural produce, we're selling exciting tourism opportunities, we're selling our high-tech education, it's a really advanced education sector, and we're selling iron ore and copper. All of those depend on us having a really innovative approach to everything that we're doing, underpinned by a highly trained workforce. So that takes me to the second point, unless you're actually developing, inventing and doing research you will see the spiral towards incompetence of the capability of your educators and your actual workforce. Another reason is quality of life. What makes life exciting? Is it having goods or is it having goods and a purpose? It's definitely the latter, in my opinion. We all want to do things, we all want to be excited, we want to be inventing, doing things and feeling that we're making progress. There are some things, of course, that can only be done by Australian research. Take agriculture, take our minerals exports, our energy exports: the challenges that we face are unique because of our particular geographical circumstances. There are just so many reasons.

JIM MINIFIE: Right, so off-the-shelf isn't going to cut it in your view?

BILL FERRIS: Yes Jim, you didn't believe it anyway, but under the heading of security, whether it's diseases, like the Hendra disease which we copped before anybody else, bird flu comes in or particular vaccines that we need to know that we can not only design but store and, by the way, along the track maybe come up with the first vaccine against cancer in the world, which we did, cervical cancer, thank you Ian Fraser et al, and/or whether it's to do with do you really want to outsource your intelligence, your defence intelligence and capabilities and knowledge? No. And we've come up with stuff like the Nulka Decoy, which is a spectacular export success now. Still under security I would put environmental

issues like, for example, we've surfaced in this report the Great Barrier Reef. It's our stuff to look after and show the world. I think under culture I agree with Alan and Petra's points, I want to be a collaborator, I don't want to be a derivative, I want to be a leader. Finally I'd say, strengthening what Alan said, we wouldn't have solved and come up with the wheat and the cotton breakthroughs, massive breakthroughs in agriculture, if we hadn't had our research at the cutting edge, nor the mining ones, and nor would we have Atlassian or Cochlear or Macquarie Bank's performance. So, no.

JIM MINIFIE: Compelling.

PETRA ANDRÉN: I wonder if anyone subscribes to that?

BILL FERRIS: I think they do and there is a case -

ALAN FINKEL: You can tell us, you didn't really mean it did you?

JIM MINIFIE: We economists in our darker moments do harbour such thoughts. Alan, talking of dark moments, sometimes I can't figure out if you're a pessimist or an optimist about this agenda.

ALAN FINKEL: It's interesting, I can look at these four sectors or the imperative areas that ISA has looked at and I can look at them as a pessimist -

JIM MINIFIE: And we'll come to these in the next 20 minutes.

ALAN FINKEL: Or I can look at them as an optimist. Perhaps let me just take one, I'll take education and I'll tell you why I'm a pessimist about where we're going, because it's not as good as it was, and I'll tell you why I'm an optimist.

I'm a pessimist because the reality is we've taken a vocational education training (VET) sector that was actually quite good and pretty much destroyed it to the point that it's much less functional than it used to be. I'm pessimistic because when you look at our school science, numeracy and literacy results through the international tests, in particular the one called PISA, we're only about the middle of the pack and we're going down. It's not a comfortable place to be. When I look into the school systems, and I'm interacting with them a lot, I see a lot of complacency. Complacency doesn't drive improvement. I see signals out there that lead to students making bad selections, for example, the ATAR encourages young kids advised by their careers advisers to take easier subjects, rather than hard subjects, so that they can maximise their score. So the ATAR inadvertently is doing something bizarre, like encouraging kids who think they might want to do engineering to do either fundamental or middle level maths instead of advanced maths so they can get the score that gets them into engineering, but once they get into engineering they don't have the maths skills that allow them to do it well. So that's depressing. In the last 15 to 20 years we've eliminated prerequisites for mathematics at the university entry level for courses that need mathematics, like economics and commerce or science and engineering.

Now, I can tell you I'm optimistic for exactly the same reasons. I'm optimistic because when I look at the VET sector I can see that there's awareness now in government driven, in part, by the recommendations that we've made in the ISA report, in part by other discussions, in part by the current Minister, that it has to be fixed. I think that through small incremental changes and eventually a large review, it will get fixed. When I look at the PISA results that 30 seconds ago were depressing me I think

well, they're not actually as bad as they are because they're not necessarily fit for purpose. We've been adding things into our curriculum that are not measured and we've been bumping out the things that are. So we now teach digital technologies, we teach design, we teach computational thinking. These are good things for the workforce of the future, but they're not picked up by PISA. So we need to learn from the ISA report. Bill mentioned the 17 metrics in one page, I think of that as the one-page dashboard. We need a one-page dashboard for measuring education so that we can have more confidence in what we're doing and see with more precision what we have to change. Our complacency, the kind of discussion we're having now, the kind of discussion the government introduced through NISA and very much what the ISA report is promoting, will improve the culture of our country. If we can strengthen the innovation culture, we'll get past the complacency.

The complacency, by the way, is there for a damn good reason. We've had 27 years of continuous recession-free growth. It's not as if we're a disaster. It's natural that you become complacent. I'm a child of immigrants and there was no question, I had to do law, engineering or medicine. But now, like all of my generation, we want our kids to follow their passion and if it's music it's music; it doesn't have to be one of these professions. So it's a difficult thing to grapple with, but I think we can. The ATAR sends the wrong signals, as I said, but that's being tackled through the ISA report, also through the Gonski Review coming up, and a special program that I'm doing with government on school/industry partnerships and industry recognises the problem. Same with the prerequisites, there's no question. I had the privilege of speaking to the collected Universities Australia Conference delegates, including all the Vice-Chancellors, on Wednesday evening last week and I called them out on the fact that they have taken away prerequisites for financial considerations, they've lowered the ATAR standards for financial considerations, and they agreed with me. They want to do something about it and we have to solve the budgetary considerations, but I think we can. So everything I see that's a problem I believe there's a solution to, we've just got to attack it.

JIM MINIFIE: Let's now dive into the report. Bill, it's probably impossible what I'm going to ask you, but could you give a capsule summary of the agenda that you've put forward in the report? Then ambition is, with the quite limited time we've got left, to whizz through at a high level the key points in each of those agenda items, then we're going to open it up for discussion.

BILL FERRIS: I mentioned we had a board of basically private sector, pragmatic people trying to come up with an actionable report for government. It's complex, as you can hear already in the conversation, start-ups to scale-ups to big business to universities to medical research institutes to government to people to international competitors, so you've got to watch you don't boil the ocean forever on this. We came up in the end with five imperatives that guided our report, a systems-based report.

The first of those five was what Alan was just talking about, if we don't educate our kids for a future workforce and equip them with the right stuff, by 2030 we put the pens down on everything else. So that's the first one, education, and that involves the VET sector and so on. The second one was looking at industry and business, how do we propel way more high growth companies in this country? One of the metrics when you look around the world is we don't have as many high growth home-grown companies yet. It's starting, thanks to people like Petra, and it's on the go, but how do we propel that to provide sustainable jobs growth out there? The third one was looking at government, how do we get a government to be more innovative itself? Not just talking about innovation, but how can it be a better and smarter innovator in procurement, service delivery etc.? We have then the fourth one that we just

talked about, research development and collaboration. To exaggerate the point, traditionally we've had the silos of great knowledge creators over here in the universities and we've had businesses over here. The business guys think they're all nerds and irrelevant and the nerds think business are only interested in next month's profit and what a waste of time. I make the exaggeration to drive the point which is so important and we've got to fix it.

So collaboration for more translation and commercialisation was the fourth imperative and the fifth one was what do we do about culture? How do you actually get people to want it, to get it, to live it, that "innovation" is not a word to tiptoe around but an important way of living for this country for people of all ages? That was the fifth construct and we built under those five, in a sense, 30 recommendations which we think are a package.

JIM MINIFIE: Let's see whether we can touch just at a high level on each of those five areas as we go through. Alan, if I can ask just very quickly, you already introduced some of the opportunities and challenges around education. Just to make it concrete, are you seeing some gems around the Australian landscape that could be expanded on and used as models where we are doing things in a smart way, or is it a uniform arena of mediocrity that we really need to completely overhaul?

ALAN FINKEL: I think it's very uneven, but it's changing for the better. If you went back five or ten years prior, universities in the R&D space didn't have a lot of interest in working with industry and probably deliberately made it difficult. They saw the money flow coming from international fees and from government and that was it. That has changed dramatically for universities in the last five years for a number of reasons and, more recently, NISA, which was the flagship program of the government in 2015, has encouraged commercialisation and has put some pressure on the universities culturally to get out there. The fact that grant funding hasn't been increasing in the ARC (Australian Research Council) and the NHMRC (National Health and Medical Research Council) has meant that the Vice-Chancellors have had to look around and say, "What are we going to do? Where's the increased research funding that we need going to come from?" So they're now quite dramatically more aware of the possibility of industry-funded research and philanthropic funding of universities. The success with which universities have been raising money from philanthropy has increased dramatically in the last five years, the same with industry engagement, and that's being promoted right now by the commitment to entrepreneurial start-ups and accelerator hubs that we're seeing in many of our universities.

One last thing I'd mention, sometimes removing a blocker is as important as adding a facilitator. You take away a negative one and mathematically that's a plus one. Minus a negative, that's a positive, right? One of the inadvertent negatives that we've had when it comes to university commercialisation is the ERA (Excellence in Research Australia) which for about ten years is the way the government measured the quality of university research. It's a very big deal, all the universities take it seriously and it's administrated by the ARC. It is completely focused on excellence through publications in international journals and the citations of those publications. Without intending to, it causes the researchers to focus purely on their lab bench research and nothing else, so when a company approaches them they say, "I don't have time. I've got to publish. I've got to help my department deliver for our university". One of the things that came out of NISA in December of 2015 was an instruction to the ARC to add a new metric to operate in parallel to measure engagement and impact to look at how that research is delivering value for our country. That has gone through a pilot which was very

successful and this year it rolls out. In anticipation of that, you're seeing the universities already change their culture because they will be measured not just by publications but by all sorts of things, including how much industry-funded research income they bring in, how many spinouts they have, how many patents they acquire.

JIM MINIFIE: Petra, do you see that rubber hitting the road, as it were, in your domain?

PETRA ANDRÉN: I certainly do, yes, in the kinds of programs that we're currently running in the medtech and the agtech spaces where we take university IP through a program and we try and incorporate a business post that three month program. That wouldn't have been possible just two years ago because there wouldn't have been the deal flow to be able to do that. So I definitely see a big change in how the universities want to engage and how they want to commercialise. I also think that the universities are treated a bit unfairly. I think we're a bit unfair on them because we keep saying that it's so difficult to deal with them, so much red tape. I actually think that they've come through and I think there's more of a problem now on the industry side. I actually think that industry needs to change its culture to try and understand universities more and try and not just use universities for quick and dirty R&D, but actually look at long term projects that have a win/win benefit. I also think that we do need to look at making it easier for SMEs to engage with the universities as well. They will contribute smaller contracts, but if you get an SME or a scale-up company you potentially will have a very long term engagement.

So what I'm trying to say is that yes, it's changed. The way that universities are incentivised, the dialogue is changing, but now we need to look at industry and actually make sure that industry also changes their culture and actually engage. There's a mutual framework for these collaborations between industry and universities for the benefit of both.

JIM MINIFIE: So much of what we've just been talking about is in the fourth agenda item of the report around research and development with a big focus on translation and collaboration. Alan or Bill, are there any points that you've put forward for government to consider to take NISA forward to further improve collaboration and translation?

BILL FERRIS: Yes, we have. I guess it segues into imperative number two about industry. I mentioned in the introduction that the through-line of our report actually is all about lack of investment by business in R&D and innovation. So I agree with Petra's comment about let's look to business rather than just universities. How do you drive more attention to innovation by business? We have in existence now a government incentive the RDTI which accounts for 85% of all government incentives for business innovation and R&D spend. It's what's called an indirect tax scheme, so it's agnostically available to any company that can claim their eligible R&D expenditures, and it's broken into two parts. For smaller companies there's a rebate of cash. Roughly 40% of R&D spent by the small businesses with under \$20 million in sales volume is refunded. It's actually, by international standards when we did the research, quite generous as a program and it is producing additionality, that is activity beyond business as usual and, indeed, those sorts of companies are spending a very high level of their total expenditure on R&D. We want more of that.

The larger companies, in the over \$20 million in sales volume, benefit from a tax offset, a premium deduction for R&D spend that they enjoy off next year's taxable income. That part of the program is sort

of okay. There's much less additionality when you look at it and overall the review that was done earlier by Finkel, Ferris and Fraser, the fondly referred to "Three Fs" review, said, "It's not a bad scheme. It should be improved. If you want it to be sustainable let's make sure it's got good integrity and that it's measurable against additionality and spill-over criteria". So we've come up with a number of recommendations about that to tighten it, to improve it. To your question, one of the things we want to add to that program is called a collaboration premium which will encourage larger companies, it's a carrot not a stick, to go to universities and other research institutions to find out what's happening and also enjoy the premium offset if they recruit PhDs in their first three years of their activity. I think Petra or Alan said before that we have a shocking stat on recruitment of PhDs by industry in this country compared to our OECD competitors, a huge difference. We just don't do it, basically. I exaggerate again to make a point, but very little seeking of PhDs. So we would hope that sort of collaboration premium will drive more activity by business with the research community. Over time the board would like to shift the balance to rebalance indirect tax incentives to business with more direct incentives.

JIM MINIFIE: But what is a direct incentive?

BILL FERRIS: A direct incentive is not a tax-specific one, things like the export market development grant scheme. In other words, if you think exporters are a good proxy for international competitiveness and innovation activity, like we do, and you look at that program and you look at the stats and it's working, why not have more of it? That's one direct measure. Co-operative research centres is another.

JIM MINIFIE: So the industry growth centres?

BILL FERRIS: Industry growth centres would fit that. They play to the strengths, the competitive sectors that you think you've got a chance at to go with. Is it picking winners by us - because that's always the next question? No, not really. We don't like picking losers if we can avoid it, but it is just playing to your strengths. We're not singling out individual companies or executives or whatever. It's saying, "Here are sectors that we're already seeing are proven through their activities and collaboration appetite etc., let's do more of that". Over time and out to 2030, let's rebalance those sorts of incentives and hopefully drive business activity remarkably higher than what we've currently got.

JIM MINIFIE: Petra, is this the sort of agenda that you want to see? Or are there things that you see when you look around the world that need to be done, but are not in this agenda?

PETRA ANDRÉN: Every agenda has to adapt to its environment and yes, we can be inspired by some things that we see around the world. One thing that I know that you have been inspired by which I was really happy to see was the SBIR (Small Business Innovation Research) program, the small business grants around challenges that you've got in the US and I know that it's modelled on that, isn't it Bill?

BILL FERRIS: Yes.

ALAN FINKEL: I can add to that. The SBIR started in 1983 in America and has had bipartisan support from 1983 to now and has run continuously. It's a multibillion dollar program that sets procurement challenges to small businesses and they have to come up with innovative solutions. Through that they supply the government, but they have the full patent rights to go out and commercialise the product. It's just fantastically successful. We've got a pilot running in Australia called BRII (Business Research Innovation Initiative) and it's truly equivalent to the SBIR. I speak with passion because in 1983 I started

a company in America and in 1986 I got an SBIR grant. That enabled us to do something that we wouldn't have otherwise done, a really radical approach to making a scientific instrument that allowed you to measure the electrical activity in individual brain cells to a level of exquisite precision that was beyond what anybody had been able to do. I wouldn't have done it without the SBIR. It wasn't a lot of money, but it was play money, in a sense. I wouldn't have gone that route without that money and that became a hugely successful product line for us. So the benefit is multiplicative. It's pretty good.

PETRA ANDRÉN: It's awesome. But there are also some things I'm less happy with and I have to represent the companies that are in my incubator. I suppose if you're a life science company you wouldn't want anyone to muck around with the R&D tax rebate scheme simply because you will spend maybe ten years developing a drug, you'll spend an awful lot of money, and you won't make any revenue. So you really need that R&D tax incentive to be able to come through and now I understand that it's going to be capped at \$4 million, which is very controversial in this particular sector. I know that Alan has an answer for me as to why I shouldn't be so concerned about this, but I am concerned because I hope that it doesn't mean that we're not going to see any more clinical trials in Australia and that we leave that pipeline development to large multinational companies. I'd hate to see no more vaccines, no more drugs being developed in Australia. Who wants to take it on?

BILL FERRIS: I have to speak to it to. There are about 13,000 companies in total in the RDTI, 11,000 of which are smaller.

PETRA ANDRÉN: And only 8% are life sciences companies that benefit from it. Is that right?

BILL FERRIS: Yes, it would be less than 10% and I'll come to that, if I can. But let's call it 11,000 smaller companies that are in the cash back scheme. On the stats we did at the \$4 million annual cap it might affect something like, I don't know, 20 to 30 of those companies out of 11,000. Now, if a company is capped at \$4 million a year it means they're spending at least \$10 million on R&D and we've proposed a \$40 million aggregate cap, as you know. It could take 10, it could take 20 years to get to that \$40 million mark and most of them would never get to it by the stats, but if they did they then only qualify for the tax offsets against profits ahead, so we've got to hope these companies do become profitable and do pay taxes or at least can expand and can reinvest their bucks and employ people and so on. So that's one response. The second is on the clinical trials front we've also formed a biomedical translation fund which has got a \$500 million pool of fresh venture capital supplied half by government and half by the super funds, which is great news, patient capital in there at last. That is aimed at clinical trials of molecules and devices where we haven't seen the money to date. It's a whole new boost for that and it is happening, they're on their tenth deal already. That started since NISA and is underway. So Petra, we hear you, but I've said enough.

ALAN FINKEL: I agree with everything that Bill said and I'll just add that it's hard to feel totally sympathetic because it's a 40% rate, so you need to spend \$10 million a year on eligible R&D in order to be able to get this benefit, and eligible means in Australia. Now, the companies that I speak to that are spending at that level are also doing R&D and running trials in other countries and they have other administrative expenses. So a company that's at the level of being entitled to \$4 million cash rebate from the government, they're probably spending \$25 million a year all up which means they have serious backers and at some point the backers have to take some responsibility.

PETRA ANDRÉN: I guess I'm just a little bit concerned about this sector at well because one of the national missions, and I agree with it, genomics, that's fantastic in health, but then, of course, I also know that ASIC's how you qualify in early stage start-ups, you need to be qualified as an early stage start-up for your investor to get the tax offset and you have to spend \$1 million for that. If you spend more than \$1 million you're no longer a small business. A lot of my companies, probably 90% of them, would spend more than that simply because of the nature of the business, which means that their investors are not actually entitled to that tax offset, which means that it's really hard to raise money for that particular category of business and, not having the R&D tax rebate to the extent they used to, I'm worried about the impact that might have going into the future.

JIM MINIFIE: Thanks all three of you for what I feel is a little vignette into the smoke-filled rooms in which these sorts of deals get hammered out between industry and government. It sounds like there's going to be a lot more of that in the future if you're successful because there's going to be a lot more activity on both sides. I'm aware of time and I think one of the great things about these events is the opportunity to have direct interaction between the broader group and the panel, so what I'm proposing to do is to very quickly ask the panellists to take one or two minutes maximum to summarise anything that we haven't touched on that is in that agenda that you think people ought to know about, and then if we can turn over to questions from the audience. For example, we haven't touched on the culture ambition, we haven't said much about government services.

PETRA ANDRÉN: Can I start?

JIM MINIFIE: Yes.

PETRA ANDRÉN: I just realised that we haven't actually touched much on talent and probably my biggest issue, i.e. the issue of the companies that I represent here today in the deep-tech cluster, is what's recently been done to the 457 visa. These companies need skilled labour to be able to scale. There are 400 people currently in my incubator and we've just lost about 50 of them. They had to go back home because of the revisions to the 457 visas. I do think that we need to do something about that urgently because it is so important. The entrepreneurship visa, I recently had somebody who's been trying to work through and it took a year for it to be approved. That is just not acceptable. We do need to look at that. We need to try and fix it and it's something we didn't talk about.

JIM MINIFIE: You're not the first person I've heard making those claims. Bill?

BILL FERRIS: We agree with Petra and we have made submissions to Minister Dutton directly, personally and for ISA, about that because on the evidence we see the high end talent that you're focused on and we are, are job multipliers. They are not job takers on the evidence. They mentor, they train and they bring skills that we currently don't have. So it's something that's critical.

PETRA ANDRÉN: And not to interrupt you Bill, but it's not just about jobs. It's, like you said, mentoring skills and that goes into the research as well at the universities. Researchers need these mentors to upskill them as well and the fact that we're now losing out on them I think is terrible. We need to do something about it. I've got all the stats to back it up, by the way, so if you want some stats from me, I'm happy to give them to you.

ALAN FINKEL: We'll take it that you don't have to convince Bill or I. We totally agree. I'll just mention something we haven't discussed today. All research depends on having modern scientific instruments. You do some research on a modern scientific instrument and you learn more and, because of what you learnt, you work out how to design the next generation of those instruments. The instruments that you're using exist at multiple levels. There are smallish ones that run in individual labs, there are fairly big ones that an institution like a university might buy, and then there are really big things, like the synchrotron down in Melbourne or the research reactor in Lucas Heights or the national marine vessel that the CSIRO runs, that are way beyond the ability of individual institutions or even clusters of institutions to purchase. We call those the national research facilities and we had enormous investment through the 2000s to about 2011 in national research facilities, billions of dollars. It stopped and so for the last five or six years we've had no investment, there's been a hiatus, but the world of science, the challenges have improved, so even if that equipment is being kept viable, it's no longer fit for purpose. Think of a laptop, you could have a perfectly functional laptop, but if it's four years old you don't want it.

So there's a need for us to reinvest at the very high level hundreds of millions of dollars per year in national research facilities. It's something we're trying to push through. It's mentioned as one of the recommendations in the ISA plan. Write to your congressman, as they would say in America, please.

JIM MINIFIE: Thank you Alan. Let me now turn to audience questions then. Thank you to some of you who sent us questions in advance and let me try to summarise a couple of those. We had several questions about climate change. One of the questions was does the panel agree that our current and projected atmospheric greenhouse concentrations mean that we face a civilizational existential threat and does the ISA recommendation map a path for Australia to play its part in solving this crisis?

BILL FERRIS: Finkel will be the best one to answer. I personally do share a view pretty close to that and I guess we haven't talked about national missions, but we did put up a strong case for an engineering adaptation approach to the possible extension and saving of the Great Barrier Reef. That wasn't about Crown of Thorns or run-off of fertilisers and so on, all of which are problems. It was actually about the impact of climate change, temperature rises and acidification in the waters, particularly in the north reef, that killed on the expert's advice roughly up to 50% - it didn't just muck around with it, it killed huge chunks. We have to take a lateral approach to try and hope either that we can get an adaptation approach with thermal hardening and other resourcing to promote the life of that reef and/or maybe one day temperatures, God help us, might actually fall and we're in a position to restore and go on with the reef. That is some hard evidence in answer to that person's question.

ALAN FINKEL: I'd add that of course we recognise the impending and enormous problem. There's another national mission which we call the hydrogen city. Let me describe where this fits in. So climate change, of course, is driven by global warming and global warming is driven by carbon dioxide emissions and equivalent greenhouse gases. Let's just focus on carbon dioxide. If you ignore all the little bits, there are four major sectors of the economy that contribute all of the carbon dioxide. The biggest by far is electricity generation. Believe me, I know about electricity generation. We will, with time, it'll take us several decades, decarbonise electricity systems. It's inevitable. Even if there are some who want to resist it, it will happen because of the economics and the opportunities from rampant technological change. With that decarbonised electricity, if we then produce a lot more than we currently produce we can look at the other three sectors. One of them is transport. We can absolutely decarbonise transport by converting to electric cars, hydrogen-powered cars and trucks and everything else. The

next one is agriculture. I'm leaving that out, it's too hard. Unless we all become vegans, I don't know what the solution is for agriculture.

The fourth and final one that most people tend to forget is called direct combustion. That's just using natural gas in the pipes in the city of Sydney and in the pipes in the cities of Melbourne, Adelaide and Hobart to heat our houses, to heat our libraries, to heat our office buildings, to heat the kilns in which we make bricks. That natural gas is methane, CH₄. It's a carbon-based fossil fuel, so when you turn on your stove or heat your house you're emitting carbon dioxide and that's one of the biggest emitters. If we can use electricity through electrolysis to make hydrogen and use that hydrogen to replace the natural gas, the methane gas, we can eliminate the emissions from one of the four big sectors of our economy. A prototype, a proof of concept which we called the Hydrogen City National Mission is one of the national missions in the ISA report.

JIM MINIFIE: Thank you. Let's open it up.

AUDIENCE: Following on from that previous question, I was really excited about those two national missions that you talked about when I read the report. I'm not going to pretend that I read it very carefully, but those stuck out to me partly because of the whole idea around the national missions of having something that's a long term goal, is high ambition, that people can understand and get behind, that really crosses a whole lot of different aspects of effort, research, expertise and technology, that feels like a big piece of what's missing when we talk about innovation in Australia. I was a little concerned that we didn't get to it until the questions, but I'm glad that we have. Having said that, with those two missions in particular, the fact that climate change emerged through those, even though it wasn't the reason why the report was being done, I also found really encouraging. I'm really interested how those are being prosecuted now in the way the report is being put out there and hopefully being taken up by government?

AUDIENCE: My question is about in preparing your report you must have looked at other countries who are higher up the league tables than we are. The names of the countries you mentioned seem to have more confidence, in way or another, in the role of taxpayers funding things and governments doing it. So you think about the US and the grant scheme you mentioned or the immense investment in technology from defence, Israel similarly, or in Singapore a much higher commitment from government to get involved in a more different way than is common in our culture. I wondered if you'd like to comment on the core of our political culture, the small government agenda, which leaves a bit of a gap to do the things that you've recommended.

AUDIENCE: My question relates to the whole narrative around innovation. The Head of MIT's Innovation Labs says that innovation is all about problem solving and if you think about Clayton Christenson from Harvard, he talks about jobs to be done. There was a lot of discussion today around what I call inputs, which is technology, knowledge, research and scientific instruments, but how much focus are we actually putting on problem solving? Just to make that real, if I think about one of the big issues we have in Sydney, one of the key issues that we're all facing is the amount of time people in Western Sydney travel to work every day. That has a whole range of externalities on people's health, on the social fabric of Western Sydney, the economy and so forth. We have a narrative that seems to be dominated by the solutions of technology, when part of a solution could simply be around having large organisations move their offices to Western Sydney and creating local areas and parks

and so forth. I think there's a tremendous opportunity to reframe the narrative away from the inputs to one around developing a problem solving culture that expands the potential solutions to the problems.

JIM MINIFIE: Terrific, three great questions. So the first one around what's happening with these national missions, are they just a thought bubble or are they being developed further?

BILL FERRIS: Well, why don't I take that one? Great question and I'm glad we got to it. We took as a board the view that the great science and technology and problems to be solved open up the opportunity for moon-shots - we call them national missions, not to be over the top.

The first one was in fact looking at healthcare because we've got a quintessentially wonderful health and medical research sector in this country in terms of its capability, its clinical platforms included, and its emerging great commercialisation as well and, as it happened, an expanding capability in genomics, not just the equipment but the people and the pathology that goes with it etc. So we looked at the healthcare system and coalesced with people that know more about it than certainly I ever would. The opportunity for genomics and precision medicine if integrated into our healthcare system to actually propel health outcomes of lasting and long term significance was very exciting. We're already at number six, roughly, in the world in terms of longevity at reasonable cost, it's 82.5 years at about \$4,700 a head if you believe the numbers, but really well-positioned in those longevity stakes in reasonable health, so why not have a crack at number one, becomes the national mission. Why not see what this health and medical research sector of ours, collaborating with others, of course, in genomics, in this huge new thrust of data and knowledge to drive earlier diagnostics, prevention, not just looking for cures, but integrating this data with the phenomics data that we have that people present with and so on is such an opportunity. As is, you didn't single that one out, the fact that we got some climate change stuff through, in spite of people perhaps not wanting to talk about it quite so much obviously.

There are there very important national missions and to your question about how are we going to get traction, we've already got a commitment on the feasibility funding for our definition of the reef mission. That's a start. On the health one, I think we're reading the tealeaves correctly, I think the government will commit the hundreds of millions that's needed to make a difference there, probably through the Medical Research Future Fund. It will need co-investment from your old friends in the states and from philanthropy to really make a big dent over the next decade, but I think it'll happen. I really do think it'll happen and if Alan keeps the advocacy going on the hydrogen front, that could happen too. There's a lot going on.

ALAN FINKEL: Just very briefly, a quick update on that. When it came to the health mission and the Great Barrier Reef I think through the ISA report we've put the spotlight on what needs to be done, which is fantastic, but there was a lot of awareness in government of the problem. When it comes to the Hydrogen City National Mission, it's brand new certainly at the federal government level. Some of the state governments are starting to get it, in particular South Australia, but at the federal government level there's no awareness whatsoever. So the advance in the last couple of weeks, I've been invited by the Federal Energy Minister to prepare a briefing for all of the Energy Ministers, state, territory and federal, which we'll do in the next few months and that'll open their awareness of where the potential is. So it's a really good first step to be invited to enter the door of the COAG Energy Council.

JIM MINIFIE: Great. The second question was around whether our small government ideology, let's call it that, the 24.7% revenue to GDP cap, for example, is holding us back and inappropriate in a world where we've got this apparently large opportunity around government engaged innovation?

BILL FERRIS: I've certainly got a view, but Petra, would you like to go first?

PETRA ANDRÉN: Well, you know what my view's going to be anyway, don't you?

BILL FERRIS: Just some stats at the start though. Part of the question was is government going to step up and do we have the right numbers? We spend 0.62% of GDP government money in a total of 2% of GDP being spent on innovation/R&D. We actually see the government climbing to about 0.7% of GDP over the next number of years, excluding the national missions, but business getting closer to 2%. So there is a considerable underinvestment in the R&D and innovation stuff if you want to be an innovative country. If you want to be in the top quartile of competitive nations, the answer is you've got to be prepared to do more. That was part of the question, I'm not sure it was the only one.

PETRA ANDRÉN: I agree, obviously.

BILL FERRIS: But mainly business. Government doing it smarter and better and facilitating, but business has got to step up with the help of academia etc. to make this big change over the next decade.

ALAN FINKEL: I was just going to say, as Bill's saying, it's not just the amount the government spends on business R&D; it's everything the government does. One of our recommendations is for the government to modernise, another one is for the government to think about its procurement policy. Look at America. Yes, they put a huge amount of money into the SBIR and DAPA and lots and lots of direct investment into mission-driven business R&D, but they also have a gigantic military industrial complex that stimulates a huge amount of R&D by the corporates.

PETRA ANDRÉN: On that I'm quickly going to interject. I just came back from a trip around Europe and Sweden, which is my home country. If I go to Sweden I go to Uppsala, which is one of our university towns and is where Pharmacia came from originally. I see this big cluster of biotech companies that have popped up all around there. Pharmacia is now off doing other things around the world, but there's a cluster there. Same if you go to Basel in Switzerland around Novartis, there is a cluster there. I don't see a cluster around ResMed, nor do I see a cluster around Cochlear or CSL. Why is it that our home-grown companies don't feel compelled to give back? I don't know why they don't have that culture. I'm asking. I don't know why that is, but it's an observation, that pay it forward/pay it back. I just don't see that happening and I think that's really disappointing. I don't know what we can do to change it, but I think it's something that's lacking.

JIM MINIFIE: The third question was around has, in some senses, the report underdone a different way to think about innovation, problem solving, actively engaging with the non-business or the non-pipeline aspects? How would you respond to that, authors?

BILL FERRIS: Well I'd start by saying the whole section on national missions and defining how we bring forward further national missions, ideas much wider around the community, is all about identifying huge problems/opportunities and how you solve them. That's certainly been in our focus. I loved your traffic

example because yes, maybe a congestion tax like Singapore would make a difference much quicker than even Alan's hydrogen combustibles, but we've got to do it all, I think.

ALAN FINKEL: The only thing I'd add is that what the ISA report is trying to do is give government a lot of ways forward that are a coherent package of recommendations and they're really quite thoughtful. Ideally, the government will adopt if not all, at least the majority of them over the next one or two years and that will facilitate the right sort of thinking. You mentioned the Head of MIT saying that the definition of innovation was solving problems or something like that. I have a personal credo that sounds totally simplistic, but not everybody shares it: there's always a better way. It doesn't matter what you're doing, no matter how well you think you're doing it, there's always a better way. When I had my own company for 23 years in America, we were our biggest competitor. We kept replacing our own products with the next generation because we knew there was always a better way. If we can convey that to government and entrepreneurs - and believing that doesn't mean doing thought bubble type things. That's another thing we've got to avoid. A better way doesn't mean just different for difference's sake. Innovation is doing things differently and doing things better and that's a whole sentence. Just doing things differently, that is not innovation. It's doing things differently and doing them better.

JIM MINIFIE: Let's do one more round of questions.

AUDIENCE: Bill, you mentioned the term "complacency". Every day I walk the corridors of my employer and walk into and face that complacency and that complacent prosperity. I'm interested to hear from you guys around how do we create this sense of urgency, this burning platform, over and above what we're already doing that allows someone like me, who absolutely buys into everything the panel has said today, to go back to my Exec and continue to challenge the way I challenge them every day?

AUDIENCE: STEM is an issue, but let's put that aside. What seems to be glaringly obvious to me personally are the connectivity issues of this country. Internet speeds are dropping. I would've thought this was pretty obvious for most certainly corporates, let alone the public sector, yet there seems to be a very deep reluctance to stand up and focus a bit more longer term than, say, the next five years. If you don't have connectivity issues solved, that's not a great sense of confidence in terms of innovation in a country like Australia.

AUDIENCE: I just wanted to pick up on two points, one that Bill mentioned and one that Alan mentioned, about the motivation to innovate or do science-based innovation being around security and also the degradation of our vocational training. I wonder what can be done or what needs to be done to improve our ability to deliver on a lot of the innovations we make in terms of our manufacturing capability or our capacity to be self-sufficient with the ideas that we develop?

JIM MINIFIE: Great, thank you. So the first question was around how to fight corporate complacency.

ALAN FINKEL: I'm happy to start on that one. We sort of touched on it in some of our other comments. We are living in a world where technological change driven by innovation is rampant. Let me just give you a couple of examples. Electricity, I led the review on the electricity sector. The reason why we've had the troubles that we've had is that everybody blames the government, but you've got to share the blame. It's the government and the regulators, they've been complacent. We had a fabulous electricity system, it was all built by state governments, we had lots and lots of coal, we had hydro, they privatised it and it ran fantastically because it had excess capacity. We sat there complacently watching that

excess capacity disappear, watched it get undermined by new technologies, such as solar, wind and batteries, and didn't get on the front foot to try to integrate those new technologies into the system. We have suffered for that, so rampant technological change that drove the price of solar down faster than our regulators anticipated. Think about the banks, we have probably one of the most advanced banking systems in the world, you notice that when you travel. You can't use PINs in some countries, you've still got to sign, even in a country called America. You can't do tap and pay in most countries. We're fantastic, but new approaches in America, such as Apple Pay and the Contact system, are going to represent enormous challenges for our existing big complacent banks.

There's no such thing as being complacent and seeing what you've got remain as it is. If you're complacent you will deteriorate in terms of your positioning. So all we have to do is think a bit towards the future and recognise that what we have now will be undermined by the international rampant technological change.

JIM MINIFIE: Thanks Alan. The next question was around some of our more basic productivity challenges, with internet speeds being one example. Why wasn't there a stinging review and critique of those sorts of infrastructure failings in the report?

BILL FERRIS: Yes, I think that might have got dumbed down in the wording. We do mention the problem because we went around the stakeholders and bang, and very dramatically of course, partly by sector, but certainly by postcodes. Many might get lucky with 5G as some sort of solution for that over the next few years, but we do call it out in the report and we have spoken verbally about it with policymakers. They get it and they know it can't be put under the rug. No solution yet from us other than push and maybe 5G. I'd like to tell a story if I could that goes from that to the third question.

JIM MINIFIE: Try it on us.

BILL FERRIS: It's a small one. It's a company called Textor. This question about how do you move to science-based and what do you do in the manufacturing of ideas and products etc. Here's this little company in Melbourne going nowhere. They were making some nappy products and that wasn't very successful. They then said, "Well, we think we can come up with an absorption that really is a breakthrough". They worked with CSIRO to do that and have the IP jointly. They had to re-invest in their Tullamarine factory with new kit, completely new equipment. To get to the end of the story, they make the absorption fabrics for Kimberly-Clark not just for Australia but around the plants worldwide. You might not like this product, but it's hundreds of millions of nappies. At least they're smaller and more efficient. They're still probably going to the same dumps, but it's a fantastic success story and their existing manufacturing workforce, they've got slightly increased employment, different jobs, retraining. So they've survived through innovation, they're export competitive, they've got an increased workforce at higher value-add average pay. It's a great story of what's possible. We're seeing more of it and it is possible. That's what we're driving for.

JIM MINIFIE: Great, thank you, Bill. Petra, do you have any thoughts on that very challenging final question around connectivity?

PETRA ANDRÉN: I can talk about connectivity because I do a lot of work in agtech and it is a problem, because there are so many technologies we could roll out to our farmers but there's no connectivity so we can't really do it. That is an issue, yes.

JIM MINIFIE: There's a huge agenda here. Just by virtue of keeping our implicit contract with whoever you're having dinner with tonight, I'd like to declare victory on this evening and to do it by thanking you, Bill, Petra and Alan, so much for taking the time and to thank all of you for joining us for what I found a very stimulating discussion. Thanks again and for those who posted questions, rest assured the panellists do have those questions in print form and will be reflecting on them this evening at dinner I'm sure. Thank you.

END OF RECORDING